

## ABSTRACT

A cathode with an improved work function, for use in a lithographic system, such as the SCALPEL™ system, which includes a buffer between a substrate and an emissive layer, where the buffer alters, randomizes, miniaturizes, and/or isolates the grain structure at a surface of the substrate to reduce the grain size, randomize crystal orientation and  
5 reduce the rate of crystal growth. The buffer layer may be a solid solution or a multiphase alloy. A method of making the cathode by depositing a buffer between a surface of the substrate and an emissive layer, where the deposited buffer alters, randomizes, miniaturizes, and/or isolates the grain structure at a surface of the substrate to reduce the grain size, randomize crystal orientation and reduce the rate of crystal growth.

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